

WEATHER, FORECASTS AND WARNINGS.

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The month opened with marked high pressure central over the Ohio Valley, fair weather and moderately low temperatures, except in the Northwest, where pressure was falling rapidly, with a low over Saskatchewan, and with higher temperatures and fair weather over the Northwest generally. Rain was falling, however, in the Pacific States. On the morning of the 2d the high area had diminished somewhat, but low temperatures continued in the South, with heavy to killing frosts in South Carolina and Georgia. Over the central and western portions of the country temperatures were considerably higher with the principal low, a moderate one, over Manitoba. Farther northwestward pressure was rising rapidly, and rains and snows had been quite general west of the Rocky Mountains. The low moved eastward over the extreme North without unusual incident, and passed off the Newfoundland coast on the 6th. It was followed by another strong high area and lower temperatures that reached the Atlantic States on the 6th.

During the last days of October and the first two days of November pressure was abnormally low over the Aleutian Islands, and on the evening of November 3 there were pronounced indications of the near approach of a storm on the north Pacific coast, and storm warnings were at once ordered for that district. On the following morning there was a marked disturbance over Alberta, the low pressure still extending westward to the coast, and the storm warnings were changed to small-craft warnings.

As stated before, pressure was high to the eastward, and beginning on the 3d snows occurred in the Rocky Mountain region and rains to the southeastward, reaching the Texas coast by the morning of the 5th, when the centers of low pressure were still over the Canadian Northwest, with a general pressure fall eastward to the Mississippi River. As pressure had continued to fall on the Pacific coast during the 4th, storm warnings were again ordered at 6.30 p. m. of that date, and continued on the following evening. Rain in fair quantity had continued west of the Rocky Mountains, but there was none to the eastward until the 6th, when there was some rain in Montana and the Dakotas. On the morning of the 7th the disturbance was central in a well-defined low over southeastern Minnesota (St. Paul, 29.44 inches), and there was a moderate secondary center over Oklahoma (29.84 inches). By this time strong high pressure prevailed over the far Northwest, a very rapid recovery having set in during the night of the 6th, but without any decided fall in temperature. Storm warnings were ordered on the Great Lakes on the morning of the 7th, and on the following morning the northern storm center was over eastern Lake Superior, and high winds had occurred generally over the upper Lakes. Storm warnings on the Lakes were then ordered continued. The southern disturbance had moved to Georgia and was still of moderate character, but the combined effect of the two depressions gave general rains east of the Mississippi River, except in New England. After the 8th the northern disturbance was not of consequence, but the southern one began to take

upon itself new energy, and after leaving the South Carolina coast it turned sharply to the northward, leaving in its wake over the Carolinas a torrential down-pour of rain which necessitated flood warnings for the rivers of South Carolina. Before the storm center had passed to the South Carolina coast storm warnings were ordered on the northeast Gulf coast and on the Atlantic coast from Jacksonville to Charleston.

On the evening of the 8th the warnings were extended northward to Fort Monroe, Va., and during the night moderately high winds occurred over the territory where warnings had been ordered on the previous afternoon. On the morning of the 9th the storm was central over northern Virginia (Mount Weather, Va., 29.10 inches), and rains and snows had fallen generally in the Lake region, the Ohio Valley, and the Atlantic States. The storm warnings were then extended along the entire Atlantic coast from Virginia northward and continued on the lower Lakes and Lake Huron. As the storm center moved northward heavy snows set in over eastern Ohio, West Virginia, and western Pennsylvania, and by the evening of the 9th more than a foot of wet snow had fallen, completely demoralizing railroad traffic and telegraph service. At this time the storm center was near Erie, Pa. (28.61 inches), and snows, rains, and gales were in progress throughout the territory from the Lake region and the Ohio Valley eastward. Storm warnings were then again ordered for Lake Superior and eastern Lake Michigan. On the morning of the 10th the storm was central a short distance north of eastern Lake Erie (Buffalo, 28.96 inches), with continued gales, snows, and rains in the Lake region, the upper Ohio Valley, the middle Atlantic States, and New England. In the South and central West pressure was rising, with somewhat lower temperatures, and heavy to killing frosts occurred in the southern States. Storm warnings were ordered to be continued on the lower Lakes and on the Atlantic coast from Virginia to Maine. During the 10th the storm lost much of its energy, and by the morning of the 11th the remnants were over the St. Lawrence Valley, the rains and snows had practically ceased, and the winds had subsided. Temperatures had fallen considerably over the eastern half of the country and there were more heavy frosts and freezing temperatures in the South. The highest wind velocity reported during the storm was 76 miles an hour from the southwest at Buffalo, N. Y., on the 10th. Middle Island in northern Lake Huron reported 56 miles an hour from the north during the afternoon of the 9th. Unfortunately a great many lives were lost during this storm, and the losses to the marine interests, mainly on Lakes Huron and Erie, amounted to several millions of dollars.

The storm was the most disastrous that has occurred in many years, although higher and more adverse winds have not been infrequent in the past, and it is practically certain that the greater portion of these disasters was due to the blinding snow carried with the northwest gales. All navigation is practically helpless during heavy snows, and on the narrow lakes a vessel that loses

its way is in imminent danger of destruction at any time. On the morning of the 12th pressure was high over the Atlantic and Gulf States, the Ohio Valley, and the lower Lake region, and a well-defined low was over northwestern Lake Superior, having moved in from the north Pacific coast since the 8th. It had thus far caused no precipitation east of the Rocky Mountains, but there had been rains to the westward. Temperatures, however, had risen decidedly over the central portion of the country and were falling in the Plateau region, with rising pressure that extended eastward into the Plains States. Small craft warnings were ordered for Lakes Huron, Erie, and Ontario at 10 a. m., and some moderately strong winds followed, and on the morning of the 13th a trough of moderately low pressure extended from western Texas to the Great Lakes with a high area on either side, and the unsettled, rainy weather incident to this type prevailed over the great central valleys and the lower Lake region, with abnormally high temperatures over the rain area. The rains later extended through the Atlantic States, and a very moderate depression moved over the Ohio Valley and the middle Atlantic States, passing off the coast during the night of the 16th, by which time more seasonable temperatures prevailed over the eastern portion of the country. On the morning of the 10th there was a moderate depression over Nevada. It remained nearly stationary for about 36 hours, causing some local rains in California, Nevada, Utah, and Arizona, and then moved eastward, merging apparently into the moderate depression noted above.

On the morning of the 15th a decided low was central north of Alberta, it being apparently the advance of an extensive general depression to the westward. There were the usual rains in the north Pacific States, and storm warnings ordered at 7 a. m. on the Washington and Oregon coasts were continued on the following morning and extended to the northern California coast. On the morning of the 16th storm warnings were ordered for central and western Lake Superior and northwestern Lake Michigan, and moderately strong winds followed. After the 16th the high-pressure area persisted over the South Atlantic States until the end of the month, with low pressure elsewhere until the 22d, especially over the Northwest, and with scattered centers of disturbance. One of these centers appeared on the central California coast during the night of the 17th, attended by general and heavy rains, and storm warnings were ordered for the southern coast. Unsettled weather also prevailed to the eastward and a disturbance from the Northwest moved rapidly eastward from the 18th to the 20th, reaching the lower St. Lawrence Valley on the latter date. It was attended by rains from the upper Mississippi Valley eastward with some moderately strong winds on the 19th over the Great Lakes, for which small-craft warnings had been previously ordered. During these days the persistent high area over the South Atlantic States caused a continuance of abnormally high temperatures over all central and northern districts east of the Rocky Mountains. West of the mountains temperatures were more moderate, and in some localities rather low for the season.

During the night of the 18th-19th there was another sharp fall in pressure over the Pacific Northwest, and on the morning of the 19th storm warnings were again ordered along the northern coast. At the same time there was another depression over extreme southern California, necessitating storm warnings on the 18th, and general rains and snows were in progress west of the

Rocky Mountains. During the 19th the northern disturbance moved eastward to Alberta with increased development, while the southern one moved to northern Arizona. Precipitation had been quite general, although mostly light, west of the Rocky Mountains, and there was no high pressure, except in the South Atlantic and east Gulf States. By the morning of the 20th there was a decided pressure fall over the Rocky Mountain region and the western portions of the Plains States, with three distinct centers of disturbance, one over Saskatchewan, one over western South Dakota, and one over northern New Mexico, and general rains and snows continued west of the mountains. By the morning of the 21st there was but a single center of depression, of pronounced character, central over Minnesota. The rains had extended through the Plains States into the Missouri and upper Mississippi Valleys and the upper Lake region, and had ceased to the westward, except over a few scattered localities. There were, however, indications of the approach of another disturbance toward the north Pacific coast. At 10 p. m. of the 20th, northeast and southeast storm warnings were ordered on the upper Lakes, and on the following morning southwest warnings were ordered for the lower Lakes. High winds occurred on the upper Lakes and brisk winds on the lower Lakes. By the morning of the 22d there was only a trough of moderately low pressure extending from the lower Mississippi Valley to Lake Superior, with a strong high area on either side, and precipitation had been light and scattered. Temperatures had been abnormally high east of the Rocky Mountains, and still continued so, but had fallen to the westward and were moderately low. Pressure had fallen sharply in north Pacific States with rains and increasing winds, and storm warnings were ordered early on the morning of the 22d.

During the 22d the northern section of the middle-west depression moved eastward, and by the evening of the 23d it had passed beyond the Canadian Maritime Provinces with greatly increased intensity, accompanied by rains and some moderately high winds of brief duration from the Ohio Valley and upper Lake region northeastward. The southeastern high area fell away slightly, and the western one developed considerable strength over the interior with clear weather and a temperature fall to almost normal conditions. At the same time the Northwest low of the 22d had moved very rapidly, but in moderate form, to the northward of Lake Superior, and another of considerable energy had reached the north Pacific coast. Incidentally it should be mentioned that the interior high area of the 22d and 23d, with the moderately low pressure to the southward, had caused general rains over interior Texas. These rains were followed by floods in various rivers, particularly the Colorado, for which ample and timely warnings were issued. The low area north of Lake Superior moved eastward about as rapidly as its immediate predecessor and was attended by very similar conditions. Preceding this disturbance small craft warnings were ordered for the Lakes. As the storm conditions persisted, the storm warnings of the 22d on the north Pacific coast were continued from day to day until the 30th. By the evening of the 24th the north Pacific storm of the 22d had reached southern Saskatchewan with diminishing intensity and another was close to the north Pacific coast. Over the eastern half of the country pressure remained high with generally clear weather. Small craft warnings and cautionary advices were issued for Lake Superior and northern Lake Michigan on the evening of the 24th, and on the following

morning northwest and southwest storm warnings were ordered for the upper Lakes and small craft warnings for the lower Lakes.

The storm center, of moderate intensity only, was then over northern Lake Superior, with a loop extending southwestward into eastern Colorado, and rains were falling throughout the Southwest. This disturbance continued eastward, attended by local rains, and unsettled conditions continued to the westward attended by quite general rains and by some snows over the extreme northern districts. Temperatures remained high, as a rule, except on the 27th, when there was a sharp fall to slightly below normal conditions over New England and the Middle Atlantic States. With abnormally high pressure persisting over the Northeast there was no opportunity for immediate change, and unsettled rainy weather with high temperatures continued at the close of the month over practically the entire country east of the Rocky Mountains. West of the mountains pressure was high on the 28th with moderately low temperatures, but by night another severe storm had reached the north Pacific coast. As has been remarked before, storm warnings were displayed on the north Pacific coast continuously from the 22d to the 30th, inclusive, with an occasional display on the California coast. The north Pacific storm of the 28th moved eastward to the Canadian Northwest, practically without precipitation, where it still remained at the close of the month, but in a very moderate form and apparently at the end of its existence. However, an offshoot from this storm moved southeastward over the Plateau region, and at the end of the month had reached northern Arizona, almost dry, and with a strong high area following. On the 28th also a slight pressure fall developed over the extreme Southwest. Rains were falling to the eastward and southeastward, and the disturbance developed slowly to the eastward and northeastward sufficiently to prolong the general rain condition prevailing over the central and eastern portions of the country, but without effective energy, and at the close of the month it was slowly dissipating over northern Missouri.

NORTHERN HEMISPHERE PRESSURE DISTRIBUTION.

Over Alaska low pressure prevailed generally throughout the month except on a few days, and there were a number of severe storms with very low pressure, Sitka reporting 28.80 inches on the 15th and 28.72 inches on the 27th. The only high pressure of consequence that occurred during the month in Alaska was on the 7th and 16th over the western portion.

Over the United States there was the usual alternation of high and low areas, the former predominating to some extent over the interior districts, and almost entirely in the Atlantic States. The only severe storm of the month was the storm that moved northward from the South Carolina coast during the night of the 8th, reaching Lake Erie on the following night with a barometer reading of 28.61 inches at Erie, Pa.

High pressure also prevailed generally throughout the month over the north Atlantic Ocean, except from the 9th to the 12th, inclusive, over the eastern ocean, where there was a decided fall in pressure, mainly on the 9th. Over Iceland pressure was low during almost the entire month, with very low barometer readings on the 15th and 17th, when they averaged more than 1 inch below the normal. Over the British Islands and western Europe, except in Spain, low pressure prevailed during

the first half of the month and uniformly high pressure during the second half. In extreme southwestern Europe pressure was high, except from the 9th to the 12th. Over eastern Europe pressure was generally low, especially after the middle of the month, and there were no periods of abnormally high pressure, the crest of the 26th over northwestern Russia having been about the most extensive.

Over Siberia there were rapidly alternating periods of highs and lows during the first two decades of the month, but during the third decade high pressure ruled almost uniformly with a strong principal crest on the 26th. The same conditions applied to Japan and China, with a principal crest over Nemuro on the last day of the month. Over the Pacific Ocean pressure appears to have been high the greater portion of the time. Over the southern Pacific, as indicated by reports from Honolulu, there were fairly strong crests from the 3d to the 6th, inclusive, and on the 24th; over the north Pacific Ocean, as indicated by reports from Dutch Harbor, in the Aleutian Islands, there were two crests of abnormally high pressure, one on the 7th and the other on the 16th, corresponding to similar crests of less intensity over western Alaska.

Average temperatures and departures from the normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since Jan. 1.	Average departures since Jan. 1.
New England.....	12	43.5	+4.2	+22.7	+2.1
Middle Atlantic.....	15	47.1	+3.2	+21.5	+2.0
South Atlantic.....	10	54.8	+0.7	+15.4	+1.4
Florida Peninsula ¹	9	66.9	+0.6	+7.8	+0.7
East Gulf.....	11	58.8	+3.2	+6.9	+0.6
West Gulf.....	11	63.1	+6.7	0.0	0.0
Ohio Valley and Tennessee.....	14	49.4	+4.6	+16.7	+1.5
Lower Lakes.....	11	44.1	+5.0	+13.6	+1.2
Upper Lakes.....	13	40.4	+6.1	+10.0	+0.9
North Dakota ¹	9	34.0	+8.4	+4.7	+0.4
Upper Mississippi Valley.....	13	46.6	+8.9	+15.6	+1.4
Missouri Valley.....	12	46.6	+9.1	+8.7	+0.8
Northern slope.....	9	37.4	+5.5	-5.3	-0.5
Middle slope.....	6	48.4	+6.6	+0.2	+0.6
Southern slope ¹	8	55.9	+5.5	-3.2	-0.3
Southern Plateau ¹	9	52.8	+2.4	-19.3	-1.8
Middle Plateau ¹	10	39.4	+2.0	-6.8	-0.6
Northern Plateau ¹	11	39.9	+3.1	-11.4	-1.0
North Pacific.....	7	47.6	+0.8	-1.2	-0.1
Middle Pacific.....	7	52.4	-0.7	+3.5	+0.3
South Pacific.....	4	58.6	+1.6	+14.4	+1.3

¹ Regular Weather Bureau and selected cooperative stations.

Average precipitation and departure from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
New England.....	11	1.77	50	-1.80	-4.60
Middle Atlantic.....	15	2.06	75	-0.70	-2.40
South Atlantic.....	11	1.36	48	-1.60	-6.30
Florida Peninsula ¹	9	1.09	50	-1.10	-8.30
East Gulf.....	11	2.10	60	-1.40	-0.50
West Gulf.....	10	3.20	103	+0.10	+2.60
Ohio Valley and Tennessee.....	14	3.71	106	+0.20	+2.30
Lower Lakes.....	10	2.73	90	-0.30	+2.00
Upper Lakes.....	14	2.12	88	-0.30	+1.30
North Dakota ¹	9	0.27	40	-0.40	-3.60
Upper Mississippi Valley.....	14	2.02	100	0.00	-2.50
Missouri Valley.....	12	1.28	100	0.00	-4.40
Northern slope.....	9	0.58	74	-0.20	+0.40
Middle slope.....	6	1.66	74	+0.70	-2.00
Southern slope ¹	8	3.50	184	+1.60	-1.10
Southern Plateau ¹	9	1.19	202	+0.60	-1.00
Middle Plateau ¹	11	1.51	186	+0.70	-0.40
Northern Plateau ¹	11	2.12	105	+0.10	-0.20
North Pacific.....	7	7.53	103	+0.20	-4.00
Middle Pacific.....	6	5.35	170	+2.20	-7.30
South Pacific.....	4	2.76	219	+1.50	-1.40

¹ Regular Weather Bureau and selected cooperative stations.

Average relative humidity and departure from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England.....	73	- 5	Missouri Valley.....	72	+ 1
Middle Atlantic.....	73	- 2	Northern slope.....	70	+ 3
South Atlantic.....	73	- 5	Middle slope.....	70	+ 8
Florida Peninsula.....	78	- 2	Southern slope.....	74	+12
East Gulf.....	74	- 2	Southern Plateau.....	63	+20
West Gulf.....	79	+ 5	Middle Plateau.....	70	+12
Ohio Valley and Tennessee.....	74	+ 1	Northern Plateau.....	72	- 2
Lower Lakes.....	77	+ 0	North Pacific.....	88	+ 4
Upper Lakes.....	79	- 1	Middle Pacific.....	83	+ 8
North Dakota.....	79	- 0	South Pacific.....	75	+ 8
Upper Mississippi Valley.....	75	+ 1			

Average cloudiness and departure from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England.....	6.0	+0.2	Missouri Valley.....	5.9	+1.1
Middle Atlantic.....	5.6	+0.3	Northern slope.....	5.6	+0.8
South Atlantic.....	3.6	-0.9	Middle slope.....	5.3	+1.4
Florida Peninsula.....	5.6	+1.1	Southern slope.....	5.6	+0.4
East Gulf.....	4.0	-0.6	Southern Plateau.....	4.1	+1.3
West Gulf.....	5.7	+1.1	Middle Plateau.....	5.3	+1.4
Ohio Valley and Tennessee.....	6.2	+0.5	Northern Plateau.....	7.6	+1.8
Lower Lakes.....	7.1	-0.2	North Pacific.....	8.1	+0.6
Upper Lakes.....	6.3	-0.8	Middle Pacific.....	6.3	+1.8
North Dakota.....	5.0	-0.4	South Pacific.....	4.6	+1.3
Upper Mississippi Valley.....	6.2	+0.9			

Maximum wind velocity.

Station.	Date.	Velocity.	Direction.	Station.	Date.	Velocity.	Direction.
Alpena, Mich.....	9	50	nw.	North Head, Wash.....			
Buffalo, N. Y.....	1	58	w.	Continued.....			
Do.....	3	60	sw.	Do.....	8	60	se.
Do.....	10	80	sw.	Do.....	15	66	se.
Do.....	17	50	sw.	Do.....	16	70	se.
Do.....	23	56	sw.	Do.....	19	62	s.
Do.....	24	50	nw.	Do.....	21	62	se.
Do.....	25	58	sw.	Do.....	22	68	s.
Burlington, Vt.....	9	50	s.	Do.....	23	60	se.
Do.....	10	58	s.	Do.....	24	72	se.
Cheyenne, Wyo.....	6	50	nw.	Do.....	25	76	se.
Cleveland, Ohio.....	9	62	nw.	Do.....	26	58	se.
Do.....	10	56	w.	Do.....	27	52	s.
Detroit, Mich.....	9	52	nw.	Do.....	28	52	se.
Duluth, Minn.....	7	62	nw.	Do.....	29	84	s.
El Paso, Tex.....	20	50	nw.	Point Reyes Light, Cal.....	19	54	nw.
Grand Haven, Mich.....	9	50	nw.	Do.....	20	53	nw.
Do.....	10	50	nw.	Do.....	26	51	s.
Green Bay, Wis.....	9	54	n.	Do.....	28	70	nw.
Helena, Mont.....	6	68	sw.	Do.....	29	57	nw.
Kansas City, Mo.....	7	60	nw.	Do.....	30	57	nw.
Ludington, Mich.....	9	50	nw.	Port Huron, Mich.....	9	58	n.
Minneapolis, Minn.....	7	50	nw.	Providence, R. I.....	9	56	se.
Mt. Tamalpais, Cal.....	19	58	nw.	St. Paul, Minn.....	7	52	n.
Do.....	20	50	nw.	Sandusky, Ohio.....	10	53	nw.
Do.....	26	52	sw.	Sioux City, Iowa.....	7	54	nw.
Do.....	27	52	nw.	Tatoosh Island, Wash.....	4	52	s.
Do.....	29	62	n.	Do.....	5	56	e.
Do.....	30	66	n.	Do.....	7	52	e.
Mount Weather, Va.....	1	50	nw.	Do.....	8	52	s.
Do.....	9	54	w.	Do.....	9	52	s.
Do.....	24	52	nw.	Do.....	15	58	s.
Do.....	25	59	nw.	Do.....	19	62	s.
New York, N. Y.....	6	64	se.	Do.....	23	64	s.
Do.....	10	52	s.	Do.....	27	50	sw.
Do.....	23	52	nw.	Do.....	28	52	e.
Do.....	24	53	nw.	Do.....	29	62	w.
North Head, Wash.....	3	56	se.	Do.....	9	52	nw.
Do.....	4	68	se.	Toledo, Ohio.....			
Do.....	5	50	w.				